REMARKS

The following is intended as a full and complete response to the Office Action mailed on July 13, 2004. Claims 1-6 and 11-22 were examined. The Examiner rejected claim 11 under 35 U.S.C. §102(e) as anticipated by Deacon (US 6,293,688). The Examiner rejected claims 1-3, 5-6, 12-13, 15-16, 18 and 20-21 under 35 U.S.C. §103(a) as being unpatentable over Deacon in view of Kashihara (US 6,563,986). The Examiner rejected claims 4, 17 and 22 under 35 U.S.C. §103(a) as being unpatentable over Deacon in view of Kashihara and Merry (US 6,015,761). The Examiner rejected claims 14 and 19 under 35 U.S.C. §103(a) as being unpatentable over Deacon in view of Kashihara and Hosoi (US 2002/0001433).

Claims 1, 3-6, and 11-22 remain pending in the Application after entry of this response. Claims 1, 3, 4, 6, 11, 13, and 18 have been amended and claim 2 has been canceled without prejudice. No new matter has been added by the amendments.

Rejections under 35 U.S.C. § 102

The Examiner rejected claim 11 under 35 U.S.C. §102(e) as anticipated by Deacon (US 6,293,688). Claim 11 has been amended to incorporate the limitations of claim 2. Withdrawal of the rejection is respectfully requested.

Rejections under 35 U.S.C. § 103

The Examiner rejected claims 1-3, 5-6, 12-13, 15-16, 18 and 20-21 under 35 U.S.C. §103(a) as being unpatentable over Deacon in view of Kashihara. Applicant respectfully traverses.

In each of the methods recited in independent claims 11, 13 and 18, a vertical tapered region is formed using a reactive ion etch process. Specifically, independent claim 11 recites the limitation of "etching a transition region with a reactive ion etch *to form vertically tapered regions* within an area between the closely spaced waveguides, wherein the reactive ion etch includes at least one polymerizing gas," independent claim 13 recites the limitation of "etching at least the transition region of the optical layer with a reactive ion etch so that the distance

separating each of the waveguides along the transition region *causes vertically tapered regions to form*," and independent claim 18 recites the limitation of "etching at least the transition region of the optical layer with a reactive ion etch, wherein the *etching forms vertically tapered regions* within the array of waveguides due to the distance separating each of the waveguides along the transition region." By contrast, in one of the two methods taught by Deacon, a lensed protrusion is formed using a two-step etch process in which the shaping of the protrusion is accomplished using a chemical etch process, not a reactive ion etch process, and, in the other method taught by Deacon, a horizontally tapered region, not a vertically tapered region, is formed using a conventional ion etch process.

In the embodiment of Figs. 7A and 7B, Deacon discloses fabricating a projection 752, which extends from a surface 732 of a waveguide, using a two-step etching process. During the first step, Deacon teaches etching away a portion of the claddings 742,744 and the core 740 proximate the projection 752 using an indiscriminate reactive ion etch process. The purpose of this first step is merely to clear away the portion of the claddings 742,744 and the core 740 that is proximate the projection 752 and extends away from the projection along the z-axis in the negative direction so that the projection 752 can be shaped during the second etch step. Importantly, the projection 752 is not shaped at all during this first step, nor is the projection 752 even exposed during this step. See Deacon at col. 21, line 64 – col. 22, line 16 ("first, the waveguide may be etched vertically by a nonselective etching process that etches both the cladding and core layers at similar rates, exposing upper and lower cladding in the region where the waveguide core 740 emerges at the surface . . . the etch proceeds approximately vertically down towards the substrate 770 . . . at this stage, the exposed surface of the semi-processed device is flat").

In the second step, the projection 752 is exposed and shaped using a selective, chemical etching process, not a reactive ion etch process. See Deacon at col. 22, lines 17-27 ("[s]econd, a selective etch may be performed on the surface, that preferentially etches the upper cladding 742 and the lower cladding 744 compared to the waveguide core 740 . . . the preferred way to perform this etch is to perform a chemical etch with a buffered HF solution").

As the foregoing shows, Figs. 7A and 7B of Deacon, at most, discloses shaping the lensed protrusion using a chemical etch process. The process of Figs. 7A and 7B therefore

plainly fails to teach or suggest forming a vertically tapered region using a reactive ion etch process, as recited in claims 11, 13 and 18.

In the embodiment of Figs. 1, 3, and 5, Deacon teaches using a conventional reactive ion etch (RIE) process to form a horizontally tapered region, not a vertically tapered region. The fact that the thickness of the tapered waveguide 330 remains constant shows that the process of Figs. 1, 3 and 5 results in a horizontal taper. Deacon emphasizes this fact throughout the specification and is also supported by the orientation of the coordinate system, in which the y-axis is the vertical axis (see col. 6, line 45).

Thus, the process of Figs. 1, 3 and 5 also fails to teach or suggest forming a vertically tapered region using a reactive ion etch process as recited in claims 11, 13 and 18.

Kashihara discloses an arrayed waveguide grating in which changes in temperature are compensated for by a slide movement member. Kashihara provides no additional disclosure to overcome the shortcomings of Deacon. Therefore, claims 11, 13, and 18 are patentable over Deacon in view of Kashihara. Claims 1, 3, 5-6, and 12; 15-16; and 20-21 are also patentable over Deacon in view of Kashihara since they depend from claims 11, 13, and 18, respectively.

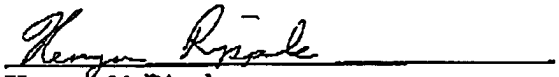
The Examiner rejected claims 4, 17 and 22 under 35 U.S.C. §103(a) as being unpatentable over Deacon and Kashihara as applied to claims 2, 15 and 20 and further in view of Merry. Merry disclosed a microwave-activated plasma process for etching dielectric layers. Merry provides no additional disclosure to overcome the shortcomings of Deacon with regard to claims 11, 13, and 18. Therefore, claims 11, 13, and 18 are patentable over Deacon in view of Kashihara and Merry. Claims 4, 17, and 22 are also patentable over Deacon in view of Kashihara and Merry since they depend from claims 11, 13, and 18, respectively.

The Examiner rejected claims 14 and 19 under 35 U.S.C. §103(a) as being unpatentable over Deacon and Kashihara as applied to claims 2 and 15 and further in view of Hosoi. Hosoi discloses an arrayed waveguide element having flat optical frequency characteristics realized by including a slab waveguide defined in a parabolic configuration. Hosoi provides no additional disclosure to overcome the shortcomings of Deacon with regard to claims 13 and 18. Therefore, claims 13 and 18 are patentable over Deacon in view of Kashihara and Hosoi. Claims 14 and 19 are also patentable over Deacon in view of Kashihara and Hosoi since they depend from claims 13 and 18, respectively.

Conclusion

Based on the above remarks, Applicant believes that he has overcome all of the rejections set forth in the Office Action mailed July 13, 2004 and that the pending claims are in condition for allowance. If the Examiner has any questions, please contact the Applicant's undersigned representative at the number provided below.

Respectfully submitted,



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